The Chemical Age

Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. LI
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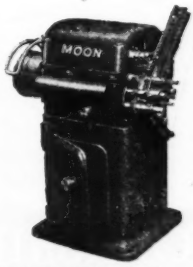

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The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

BOUVERIE HOUSE, 154 FLEET STREET, LONDON, E.C.4

Telegrams: ALLANGAS FLEET LONDON — Telephone: CENTRAL 3212 (10 lines)
GLASGOW: 116 Hope Street (Central 3970) — BIRMINGHAM: Daimler House, Paradise Street (Midland 0784-5)

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Progress in an Ancillary Industry

THE operation of carbonising coal and of recovering the by-products is a branch of the chemical industry; the design of the plant depends on the principles of chemical engineering; many of the products obtained are raw materials for what may be termed the chemical industry proper. It has been pointed out in these columns previously that the chemical industry of the future may be dependent upon coal for many raw materials which in America are obtained from petroleum. It is distinctly interesting that two Presidential Addresses have been given during October dealing with developments in the carbonising industries. One of these, Dr. E. W. Smith's address to the Institute of Fuel, surveyed the progress of the gas industry within the last 40 years or so; the other, Mr. E. Harrison's address to the Coke-Oven Managers' Association, discussed the problems of the coke-oven industry.

Dr. Smith's survey shows that the gas industry has made immense progress during the period. His conclusion is that although it has become the fashion in some quarters to assume that the gas industry is rapidly coming to the end of its useful life, and to assume that for many years technical developments in coal carbonisation have been few or non-existent, actually the exact opposite is the truth. "Not only is gas being used more and more as a heating medium, but the possibilities in the future for the development of the carbonising industries are greater than they have ever been." Many technical developments, to which Dr. Smith makes reference, have occurred during the last 40 years, and there are many more to which he had no space to refer. From 1907 onwards the industry has been conducting organised co-operative research under the general direction of the Institution of Gas Engineers. This research has had many positive results, and it has also had the indirect result of providing for the industry men of high scientific ability who, after a period spent in research, have usually settled down in some gas undertaking or contracting firm, to the benefit of the industry as a whole.

Typical of the results of research is the improvement in refractory materials. In 1909 there was formed a joint committee of the Institution of Gas Engineers and the retort and firebrick section of the Society of British Gas Industries — the contractors who provide the retorting

On Other Pages

equipment. The result was that in 1910 the average life of horizontal retorts was found to be 797 days, and with patching 1257 days. By 1934 their average life had risen to 1700 days, extending quite commonly to more than 2000 days, although the carbonising temperatures had risen very greatly between the two dates mentioned and the yield of gas had been increased by over 40 per cent. In this work the Institution of Gas Engineers took a prominent part—another example of the value of technical direction. In Dr. Smith's words: "The part played by the Institution of Gas Engineers in these developments is a signal example of the value to an industry of having an organisation which can . . . arrange to fill in gaps where important activities are being neglected, and provide a platform for the discussion of both technical and administrative ideas."

Among further developments of this period brief mention may be made of the change-over from a lighting to a heating standard, of a complete revolution in the design of gas appliances, of the introduction of the vertical retort together with steaming within the retort, of developments in by-product recovery and in gas purification, in the recovery of benzol and the greater use of coke-oven gas by the gas industry. How were these developments brought about? They were not solely due to the manufacturers of gas, though the staffs of gas undertakings certainly played their part. This is worth emphasising because the impression would seem to be abroad in the chemical industry that developments there are due to the chemical engineers employed in production, while the chemical engineers employed in the manufacture of plant are of little account.

Technical progress in the gas industry is derived from three sources: (1) the gas undertakings who manufacture, supply, and sell gas and by-products; (2) the contractors and manufacturers who develop and supply the plant and apparatus to the gas undertakings; and (3) the research organisation supported by the industry. Dr. Smith has been associated with each of these sources of progress and he is perfectly definite about the part played by the manufacturers of plant, *working in close collaboration with the gas undertakings.* We have long urged a similar liaison between the chemical manufacturers and the plant manufacturers.

Mr. Harrison's address to the Coke-Oven Managers' Association shows that the industry is thinking in terms of more by-products for the future. He says: "Alternative methods for the use of our gas might be evolved, *e.g.*, the extraction of methane—liquid or gas. Research along these lines is being carried out by the Gas Research Board. The Council (of the C.O.M.A.) is negotiating with the Gas Research Board with a view to collaborating with them in their work. There is one plant in England already working and another almost completed for the extraction of ethylene from coke-oven gas . . . the maximum amount of benzol and toluol should be produced. . . . The system of continuous distillation with fractionation has been applied to the separation of benzene, toluene, and xylene from crude benzol. . . . Old methods are being critically reviewed in the light of new knowledge, and criticism will no doubt penetrate deeper yet into present-day practice of working up coal tar. The future for naphthalene appears to be brighter than its chequered past might indicate. Its importance as a basic chemical of the plastic and paint industries justifies the hope that the days of its extensive use as a firelighter are numbered. Pitch, too, is gradually finding more outlets. It is an ideal fuel in both powder and molten form or when dissolved in creosote oil. . . . Its value as a cheap plastic or binding material is apparent on the modern highway. . . . The chemical aspect is at present commercially unexplored but might offer possibilities for research."

To this Mr. Harrison might have added that pitch and pitch-creosote have been used in the gas industry for the manufacture of gas with simultaneous production of carbon black, a material hitherto imported from America. While all these developments are of interest, the news that ethylene is to be recovered is perhaps the outstanding technical fact; it suggests that the organic chemical industry will soon be in possession of more raw materials which may lead to far-reaching developments.

NOTES AND COMMENTS

Latin America

AMONG the many and far-reaching changes brought about by the war, those concerning the vast expanses of Latin America are by no means the least important. Some of the Latin American countries have ceased to be merely suppliers of raw materials and food products. Two world-wide conflicts have rapidly increased their industrial capacity. As has frequently been recorded in THE CHEMICAL AGE, industrialisation programmes are being carried out, which cannot fail to bring about significant changes in the world's economy. According to qualified observers, a more pronounced economic nationalism is to be expected after the war. As a result of a vast increase in the flow of essential goods to the United States, and also to this country, large balances of foreign exchange have accumulated. The owners of these funds are anxious to obtain capital goods and services in return as soon as possible after the war, a process which will invitably result in a further development of their territories. In this connection, it is not without significance that plans to aid the industrialisation of the Latin American republics are soon to be considered in the United States.

Market for British Chemicals

A MIXED U.S.-Mexican commission, to expand Mexico's industries, was set up some time ago, and is to serve as a pattern for future policy. While the development of Latin America, and the raising of the standard of living of its peoples (often sadly neglected) on the one hand, and the employment of American workers on the other, are exceedingly desirable in the interests of an expanding world economy, it is to be hoped that this will not act to the detriment of other countries. Ever since the states on the Latin American continent gained their independence, they have had close ties with this country, and more recently with the British Commonwealth of Nations. It is therefore hardly necessary to state Britain's claims in general terms. However, our readers will, no doubt, appreciate the more detailed analysis, appearing on p. 441, of the potential demand of that Continent for chemical and allied products. Vast possibilities there will be; but exports do not come for the asking, and great efforts and the discarding of outworn conceptions will be absolutely essential.

Microanalysis and Industry

SEVERAL fundamental points were stressed in the course of the Yorkshire microchemical symposium described elsewhere in this issue. The meeting was notable for its joint consideration of the place of microanalysis in industrial analytical technique and of the teaching of microchemical methods. There can be no progress, in this or in any other subject, without education. That microchemical methods are capable of giving results of high value, results, indeed, which can be obtained in no other way, is now reasonably widely recognised in this country; and, as Mr. Belcher pointed out in the course of his address, while there are still some misconceptions about the exact functions of microchemistry in industry, there has recently been an acceptable increase in the number of industrial laboratories making use of the advances. However, until this country has a school of microchemistry comparable with those existing in America, and (we hope still) in Europe, the position of the subject here, and consequently its advance in this country, cannot be regarded as being satisfactory. That microchemistry can be taught to young workers, even workers who are otherwise relatively untrained in ordinary chemical procedures, was well shown by the demonstrations given by Rotherham students to those who attended the meeting. Some of these students, it appears, had their first acquaintance with qualitative inorganic analysis as a microchemical procedure, and now, on attending more orthodox classes for qualifying examinations, feel themselves unutterably foolish when dealing with chemicals on the "bucket" scale. Their competence on the micro-scale had to be seen to be believed. Instrumental methods, which also formed part of the demonstrations, are obviously suited to rapid training, and to the conditions which apply in

industry. Unfortunately, none of these techniques are well enough known in this country, nor widely enough taught.

Training the Microchemist

THE system proposed by Dr. Wilson, of three types of microchemical course, would go far towards supplying the demand for a microchemical school, and towards supplying also the demand which industry must surely make when a few more meetings of this nature have awakened it thoroughly to the possibilities latent in micro procedures. Dr. Wilson favours (i) general courses; (ii) specialised courses in specific highly developed branches; and (iii) final specialised courses in less known or less developed branches. The first type of course is intended to cover the whole field in a broadly educative fashion, the second is intended to train highly qualified analysts in special branches, while the third type is to point out the possibilities of further development. As Dr. Wilson expressed it, the first type indicates the demand, the second supplies it, and the third creates it. While this may not be the last word in the organisation of microchemical education in such a way that it may prove of most use to British industry in the critical times ahead, it is at least a desirable foundation on which to build something of more lasting value.

Tropical Packaging

CHANGES in the orientation of the war effort imply changes in the methods of manufacture and transport of munitions. Military authorities in the Tropics have been complaining bitterly that much of the Service equipment manufactured for Europe could not be used when it reached the Far East, a complaint which becomes more urgent as the pressure of war in the Pacific and Burma sectors becomes more intense. Research, consequently, has led to the adoption by the British and American Service authorities of new standards for the packing of stores. To guide manufacturers who, it is held, should be responsible for taking the necessary precautions to ensure that their products are in a usable condition when they reach the men that need them, an Anglo-American Services Exhibition of tropical preservation and packaging was opened on Friday last week by Mr. Oliver Lyttelton at the Feltham Ordnance Depôt, near London. Photographs, films, and actual packages—including a "chamber of horrors" illustrating what happens when packs are inadequate—show the hazards that have to be overcome and the methods used to withstand them. Three main types of packaging have accordingly been devised, on the assumption that the outer container must face tropical storage for twelve months, while the inner container must be suited to cope with a further period of 30 days after the removal of the outer cover.

Preservative Chemicals

IT is here that the chemical industry comes in. In Method 1, equipment and spares are given heavy coatings of corrosion preventatives, the package itself not being sealed; in Method 1a, a waterproof sealed package is used, the contents of which have light, easily removable, corrosion preventatives applied to them, with sufficient sealing to resist liquid penetration. Method 2 is used for equipment which cannot be actually coated with preservative. The contents of such packages are entirely surrounded by a sealed water-proof and vapour-proof barrier, generally with a dehydrant, such as silica gel, enclosed within the package. Even in this last case surfaces subject to corrosion are given a preservative coating of the light oil type, whenever practicable. Small metal parts, suited to Method 1, are given a thick coating of ethyl cellulose, which can eventually be peeled off whole. Some of the completely covered packages in transparent wrappings contain a humidity indicator, which is blue in colour so long as the enclosed air remains dry, but changes to pink if damp creeps in. Colonel Sewall, commandant of the depôt, said that in the early years of the war we were losing 50 per cent. of our war stores by agencies other than enemy action, and it was obvious that new standards of preservation would have to be applied. The exhibition represents the minimum requirements, and it is to be hoped that the exhibits will have achieved their objective—to convince industry of the necessity for the new standards, and to convince contractors that it is their duty to carry out the work.

Hydro-Electric Development*

Its Influence on the Chemical and Allied Industries

by SIR ALEXANDER GIBB, G.B.E., C.B., LL.D., F.R.S., M.Inst.C.E., M.I.Mech.E., M.I.Chem.E.

Sir Alexander Gibb

IT was a source of great gratification to me to be invited to deliver this, the fifth Hinchley Memorial Lecture, before the Institution of Chemical Engineers. For, apart from the privilege of addressing its members on what is considered to be one of the more special occasions in the life of the Institution, it enables me to revive some very pleasant memories of the time when, as a former president, I had close associations with its first honorary secretary, Professor J. W. Hinchley, the man whose life and work we are honouring this afternoon.

Much has been spoken and written on this subject both before and since I suggested to your Council the title for this address, and I feel bound to state that in my opinion a certain amount of misconception appears to exist in regard to the part which hydro-electric schemes can play in our national economy. One of my chief objects is to present to you a clear view of the position.

Earlier Developments

Chemical engineering in certain of its applications depends on a cheap supply of electrical power. By the selection of favourable sites, earlier hydro-electric development in Scotland was able to supply this cheap power to the British Aluminium Company, which has since rendered such signal service to this country. Since then further development has taken place, but the total capacity of hydro-electric plants in Great Britain constructed for the sole purpose of supplying power to electro-metallurgical industries has not yet exceeded the figure of 108,000 kW, or 145,000 electrical h.p. Upon this subject the Committee on Hydro-Electric Development in Scotland, under the chairmanship of Lord Cooper, which published its report in December, 1942, commented that the Caledonian Power Bill which was thrice rejected on the Second Reading in the House of Commons, represented the first and only attempt which has been made to establish electro-chemical industry on a hydro-electric foundation in the United Kingdom, and that the defeat of the Bill could only be regarded as a major mistake not only for Scotland but for Great Britain. Additional power from hydro-electric sources has, however, become available in recent years, the great majority of these developments having been carried out in Scotland, bringing the total capacity of existing installations in Scotland up to over 310,000 kW. About one-third of this capacity is utilised for electro-metallurgical processes and the remainder for public power supply. The only other hydro-electric stations in Great Britain of any importance are those in the Snowdon area operated by the North Wales Power Company. In this area as elsewhere no recent development has taken place.

Such provision of hydro-electric power as has occurred during the last few years can be attributed, not so much to the desire to provide cheap power to electro-chemical and metallurgical industries, although the urgent need for this was realised by the supporters of the Caledonian Scheme, as to the passing of the Electricity Act of 1926, and the opportunity thus provided for the generation of power in sparsely populated and essentially rural areas of the country and its utilisation in the main industrial centres. With the coming of the North of Scotland Hydro-Electric Development Act in 1943, however, the way has been cleared for the progressive utilisation of the water power resources of the Highlands, and the years immediately following the war should see an ever-increasing contribution from this area towards the electrical requirements of Great Britain.

Power from the Tides

Progress in the utilisation of power from the tides has been, to say the least, disappointing. No project has yet been started in this country in spite of the fact that the Severn Barrage Committee in its Report of 1933 confirmed that technically the project

* The Fifth Hinchley Memorial Lecture, delivered before the Institution of Chemical Engineers on October 27 (*Abridged*).

was a sound one, although financially there was some slight doubt as to whether it could compete against modern thermal power stations. The Ministry of Fuel and Power has recently called for a further examination of this scheme and the Committee's Report should be available shortly.

Several factors have arisen since 1928 which affect the whole question of the development of electrical power in Great Britain from sources dependent on rainfall and from the tides. Among these factors I would suggest that the growing realisation of the need to conserve our coal resources is the most important. In 1938 coal represented 88 per cent. by value of all mineral production of Great Britain, but of the 227 million tons of coal mined in that year, only 38 to 40 million tons were carbonised. By-products are thus only available from a small proportion of the total coal produced, and it is therefore of the utmost importance to the country as a whole, and to the chemical industry in particular, to effect such savings in coal consumption as may be possible, in order that the amount available for processing may be increased. There is obviously something wrong with our economic system if it continues to allow the main source of our wealth to be frittered away, when some part of it can be saved by harnessing the inexhaustible sources of rainfall and tidal power. Let us for a moment consider the extent to which our water resources can contribute towards this desirable end.

The Severn Barrage

Taking first the Severn Barrage, it was estimated in 1933 that this scheme could produce intermittently a total of 2200 million units of electricity per annum. When combined with pumped storage, it was calculated that a continuous and regulated supply of 1610 million units per annum could be delivered to the grid system. I would draw your attention to the limited economic value of an unregulated and intermittent supply of electric power, such as would normally be associated with a tidal scheme. Such a supply can only be considered of value from the point of view of the coal which would be saved, since it would not avoid the necessity for building a steam plant to carry the load at those times when the tidal plant was shut down.

The conversion of the intermittent supply afforded by a straight run-of-tide plant into a continuous supply greatly increases the cost of the installation and, as the figures which I have quoted above show, results in a serious loss of the energy generated by the tidal turbines. In order to avoid the loss of energy necessarily associated with the conversion of an intermittent supply into a continuous one, the possibility of developing chemical or metallurgical processes, which could be based upon an unregulated source of tidal power, should not be overlooked, and I would like to take this opportunity of directing the attention of the members of this Institution to the important results which might flow from the successful solution of the technical difficulties involved.

Inland Water Resources

As regards our inland water resources, recent investigations have shown that previous estimates were all too low. The Earl of Airlie, chairman of the North of Scotland Hydro-Electric Board, has stated that the approximate potential annual average output from the area covered by the Board amounts to 6274 million units per annum, and that this is still believed to be a conservative figure. To this must be added an equally conservative figure, for the output of the various schemes already in operation, of 1280 million units. No estimates of the potential resources of England and Wales has been made since 1921, when the Water Power Resources Committee put forward a figure of 377 million units per annum. As we have seen, more recent investigations have disclosed that the Committee's estimate for Scotland was very much below the mark and, as it would seem reasonable to suppose that the 1921 estimate of the potential power available in England and Wales may prove equally low, I think the time has come when a new Committee should be set up to review the matter.

We thus see that we have a potential hydro-electric supply of not less than 9541 million units per annum, a figure which represents nearly 40 per cent. of all power generated by authorised undertakers in Great Britain in 1938, and moreover represents a useful annual saving in coal of some 6,400,000 tons, based on pre-war average consumption of coal of 1¼ lb. per unit, a figure which is approaching 1 lb. per unit, as new and more efficient steam power stations are brought into commission. It must not be assumed, however, that this conservation of coal will necessarily release further supplies of raw material to the chemical industry. This is an assumption which I feel should at once be corrected.

Since 1929, the increase of electrical output in this country was such that we may anticipate an increment after the war of the order of 2400 million units per annum. Even if hydro-electric development proceeds with all speed, we can hardly anticipate that the output from these sources will be developed at a rate greater than about one-quarter of that required to meet the country's increased needs. The question as to whether coal used in steam power stations is, or is not, suitable for use as a raw material in chemical industry does not arise, for the saving

of coal resulting from the utilisation of our water power resources is swallowed up three times over, and no direct contribution to the raw material requirements of industry results.

Increased production of coal is an obvious solution to this problem, but such a solution may neither be possible nor wise. It has been estimated that Great Britain has sufficient reserves of coal to last for a further six centuries at the 1938 rate of production. This estimate includes all coal to a depth of 4000 feet and all seams to a minimum thickness of one foot with an allowance of 20 per cent. loss during mining operations. The comparative figure for the U.S.A. is 100 centuries, and for the whole world is, very approximately, at least 60 centuries.

I regard as of the highest importance the investigations now being carried out by the Fuel Research Station under Dr. Parker. It is from these and other researches that we may find a solution which will make the fullest use of our remaining coal, while at the same time providing adequate power, light, heat and hydrocarbons for the development of our industries. I am relieved to find that I am not alone in my view that underground gasification has yet to prove itself, and that it can by no means be regarded at the moment as the panacea which we are seeking.

The Economics of Power

A second factor of importance affecting hydro-electric development is that of cost. The economics of power generation is a most complicated subject, but this review would be incomplete without a brief reference to it. It can be said that, while the capital cost of a steam power station is in general low compared with that of a hydro-station of equivalent size, it has a shorter life, and the cost of fuel comprises a large proportion of its annual charges as against interest on and repayment of loans in the case of the hydro-station. Now, the cost of coal has risen rapidly during recent years, and, owing to difficulties in mining as seams get thinner and as work is carried to deeper levels, I cannot see that coal prices will do other than go on increasing. As a result of research, there may be improvements in mining technique and equipment, but already 69 per cent. of the coal produced in Great Britain is machine-minded. Moreover, mining methods employed in the United States are not necessarily suitable for use in our coalfields.

This increase in the cost of coal more than offsets the increased cost of civil engineering works, which plays so large a part in the development of water power, and which should be stabilised once the building and civil engineering industry has again been placed on a peace-time footing. But, while it may be said that these two factors to some degree balance each other, the basic rate of interest on borrowed capital has fallen and this places hydro-electric development in a much more favourable light. In addition, steps are now being taken to adjust the valuation and rating of water power installations to a basis comparable with that of thermal stations, and, when it is appreciated that at present the hydro-electric installation pays something like twice the rates of a steam power station of similar capacity, you will see that this adjustment will also encourage the harnessing of our water resources. The co-operation of the Electricity Commissioners through all stages of a project, and the presence of grid transmission lines, has removed to a certain extent the emphasis laid on the source of power being immediately adjacent to the consumer.

In the Hydro-Electric Development Act the price to be paid by the Central Electricity Board for power derived from hydro-electric resources is ascertained from comparable costs of production at the most economical steam power stations. This implies that, for a consumer drawing power from areas outside that of the North of Scotland Hydro-Electric Board, the cost of electrical energy will not be affected by supplies derived from this source. The Act also calls upon the Board to provide supplies of electricity required to meet the demands of ordinary consumers in such parts of the North of Scotland district as are outside the areas of supply of other authorised undertakers. It follows, therefore, that such water power schemes as are developed in the Highlands must, taken as a whole, be able to distribute energy to the thinly populated areas of Scotland (which can only be done at a loss), and to supply power to the Central Electricity Board at rates equivalent to those from a modern steam power station. In addition, the North of Scotland Board is left free to offer bulk supplies of power at rates which will prove acceptable to industry within their area of supply.

Collective Purchase of Energy

I understand that it may be possible to produce a tariff which will enable energy to be purchased at a figure round about ¼d. per unit. This would only apply, however, to large blocks of high-load-factor energy. Doubtless a tariff will be produced which will apply equally to all consumers taking the same demand at the same load factor. To enable high-load-factor purchasers, such as the chemical industry, to reach the lower price steps in the sliding scale tariff, it may be desirable that they should purchase collectively through some medium such as a trading estate.

There is a third factor which should not be ignored and that is national security.

This country must surely develop her water resources to the full as a measure of self-defence, so that she may react the more rapidly to any temporary loss of outside sources of supply of vital materials such as those produced by the chemical industry. Fortunately, a growing realisation that the well-being of the country as a whole is of prior importance is replacing the narrow view that the use of power derived from water should be restricted to local requirements.

At this stage, I should like to pay a tribute to the work of the Industrial Chemist, who, in conjunction with the staff of the Building Research Station, is developing cements having the special properties required in the construction of dams and aqueducts.

(To be continued)

DDT in Sweden

Compulsory Licence Demanded

ACCORDING to advices received by THE CHEMICAL AGE from Switzerland, the new insecticide "Gesarol," containing 5 per cent. DDT (*see* THE CHEMICAL AGE, September 9, p. 245), produced by Geigy A.G., of Basle, has attracted considerable interest in Sweden, where it was already being marketed by the Geigy sales organisation early this year. Gesarol has been found most effective in Sweden against a number of insects, especially against beetles attacking rapeseed. There is also great demand for Gesarol spray against flies. The State Forest Administration is using an aeroplane, specially equipped with spray apparatus, in its warfare against forest pests.

The growing popularity of the Swiss product has given rise to a number of demands from Swedish industry for restrictive measures against Geigy, including a compulsory licence for Gesarol. Sweden's largest producer of insecticides is the powerful Boliden A/B, and the demands are no doubt prompted by concern over the shrinkage of the local market for insecticides based on arsenic and nicotine, while Swedish interests point to the large sums which have to be transferred abroad, and criticise Geigy's arrangements for supplying the market. At the same time, several Swedish concerns are endeavouring to manufacture a product similar to Gesarol.

Meanwhile, the Geigy company emphasises the advantage of having Gesarol available in a country as rich in timber as Sweden; it is announced, moreover, that the possibilities of manufacturing the product in Sweden from imported materials are being examined. Considering the friendly relations that have long existed between the two countries, an early settlement of this dispute is expected.

Fractional Freezing

Purification of Chemical Standards

TWO variations of the method of purifying liquids by slow fractional freezing were applied to benzoic acid by F. W. Schwab and E. Wichers (*J. Res.*, 1944, June, RP1588), and were found much more effective than previous trials of crystallisation from solvents. In the first, a cylindrical vessel containing the fused substance is slowly lowered, by means of a floating table, through a heating coil. Freezing begins at the bottom and progresses upward as the tube emerges slowly from the heated zone. The impurities in the substance tend to remain in the liquid, which is constantly stirred, and thus are concentrated in the portion that freezes last. After the whole mass is frozen, the upper end is cut off and discarded.

In the second technique, which is applicable to larger quantities of material and provides a greater area of solid surface in proportion to the quantity of material to be frozen, a spherical flask is filled with the molten substance and is then buried in highly efficient thermal insulation. Freezing begins on the wall of the flask and is allowed to progress slowly inward until the desired fraction has solidified. Meanwhile, the liquid is constantly stirred to prevent accumulation of impurities at the boundary between the solid and the liquid. The portion of liquid which is to be discarded is drawn off with a siphon. This method was also used for preparing highly purified acetanilide for use as a chemical standard. This substance, like benzoic acid, freezes well above ordinary temperatures, so that the flask needed only to be well insulated to control the rate of freezing. The same method can be applied to substances freezing below room temperature by refrigerating the outside of the container.

BRAZIL TO MAKE DDT

It is planned to place on the Brazilian market a number of products containing from 5 to 10 per cent. DDT. They will include preparations in powder and liquid form for agricultural and household uses, as well as those against specific pests.

Large quantities of sulphur and arsenical insecticides are now used in Brazil. Although the most important outlet for DDT would appear to be in agriculture, the effectiveness of this new insecticide against the Sauva ant, one of the most serious threats to farming areas, has not yet been established.

Since the synthetic organic chemicals used in the manufacture of DDT are not produced in Brazil, the raw materials would have to be imported.

The Latin American Market

Post-War Trade in Chemicals

ONE of the most vital post-war problems to be solved by Great Britain is that of her position in the world market after the war. The Bank of London and South America has issued an interesting memorandum dealing with the possibilities of post-war trade between the United Kingdom and Latin America.

Large Foreign Balances

The outstanding feature in Latin America's economy, it is noted, is the accumulation of large balances abroad. This is largely due to the buoyancy in Latin American export trade, side by side with restriction of imports because of war priorities both in the United States and in the United Kingdom. These balances represent pent-up purchasing power, which has so far not been able to find an outlet. Over and above these considerations, there is every evidence of willingness in Latin America to resume trade with the United Kingdom as soon as possible.

Argentina, to begin with, imported half its mineral lubricating oil requirements from the United Kingdom and is anxious to do so again when oil exports from the U.K. are resumed. As regards chemical and pharmaceutical products, paints, and dyes, the United Kingdom occupied a leading place and may hold the ground which she has won during the war, thanks to the elimination of competition from enemy and enemy-occupied countries.

Paraguay's post-war import requirements include chemicals (industrial and medicinal), paints, and plastics, while *Uruguay* specifies chemical and pharmaceutical products, *e.g.*, heavy chemical products for industrial purposes, sulphur, carbolic acid, arsenic, perfume, cosmetics, sundry pharmaceutical products, chemicals for water purification, soaps, fuels, and lubricants. Great Britain was also the chief pre-war supplier of non-ferrous metals and metallic oxides, and British coal and fuel oil will be preferred to other sources of supply as soon as delivery becomes possible.

In *Brazil*, caustic soda, soda ash, and other heavy chemicals will have a more limited market in future as a result of increases in domestic production, but there is likely to be a good demand for many of the "novelties," such as plastics, new glass inventions, dyes and pharmaceuticals.

Chile reports that, with the elimination of the Axis nations and the occupied countries in Europe, there is no competition to speak of, and everything that Great Britain can ship finds a ready market. But it must not be overlooked that national industries have progressed considerably since the outbreak of war (*see* THE CHEMICAL AGE, September 23, p. 301) Two important concerns have taken up plastics; in addition to the Melón cement factory, a new factory has been put up near the port of Coquimbo and two plants have recently been erected to produce sodium carbonate, sodium sulphate, and other industrial chemicals. Production of aniline dyes has also started. Increasing quantities of materials required by the paint industry are being manufactured locally, but the quality of these is admittedly below that of British products, which should be able to regain a large part of the market.

Local manufacture in *Peru* has developed to a marked degree, including production of cement, lubricating oils, sulphuric acid, ochres, paints, soaps, perfumery, boot and floor polishes. It is likely, however, that there will always be demand for high-grade chemical and pharmaceuticals, produced in Great Britain and there will be a good market for new plastics. A coal and iron industry is to be established in the Chimbote Bay area.

Ecuador, although a small market, will continue to need heavy chemicals and drugs, artificial silk, aniline dyes and dry colours.

Colombia was always a good customer of Great Britain and imported chiefly the following articles: caustic soda, sodium carbonate, dyes, dynamite, biological and pharmaceutical products, insecticides, fertilisers, paraffin, and fuel oil.

Venezuela, in view of her large remittances from the oil companies under British control, should have an ample exchange reserve to support a greater volume of purchases from the United Kingdom than before the war. She needs all kinds of chemicals and pharmaceuticals and Britain should endeavour to take a large share of the market for patent medicines and proprietary lines, previously dominated by Germany.

British manufacturers also held a prominent place in the pre-war trade of *Guatemala* and *Nicaragua*, especially for fertilisers, pharmaceutical products, paints and varnishes, while *El Salvador* bought chemical products, especially paints, white lead, and linseed oil.

The Decimal System

One remark which appears in all reports from South America is the following: "The use of the decimal system in English currency, weights, and measurements, would be of enormous value and meet with complete approval from both agents and buyers."

Microchemistry

Meetings in South Yorkshire

THE recent statement of the president of the Society of Public Analysts, in welcoming the new chairman of the Microchemical Group of that Society, to the effect that the Sheffield district might be regarded as the home of microchemistry in this country, was appropriately underlined by a recent symposium. This was held under the auspices of the South Yorkshire Branch of the Royal Institute of Chemistry and the Sheffield Metallurgical Association. On the evening of October 13, in the Department of Applied Science, St. George's Square, Sheffield, Mr. R. Belcher, F.R.I.C., spoke on "Industrial Applications of Microchemical Analysis." In the course of his address he illustrated how the use of microchemical methods could supplement the more usual procedures to advantage in such fields as fuel analysis, metallurgical analysis, and the analysis of explosives and of rubber.

Apparatus Demonstrated

On the following morning, at Rotherham Technical College, there was a demonstration of apparatus and technique, arranged by Mr. Belcher. Several students who had attended courses organised in the College by Mr. Belcher gave demonstrations of qualitative organic and inorganic analysis, including methods which could be applied to group separations. Other demonstrations of technique included the application of the "magic eye" to electrometric titrations, the polarograph and the electrograph, chromatographic adsorption, and fluorescent indicators. The Emich boiling point method, using Morton and Mahoney's optical system, was also displayed, as were several pieces of apparatus lent by Griffin and Tatlock, Ltd., including the Elekhardt micro-acetyl apparatus and the Kirk apparatus for ammonia distillation. The exhibition also included a number of specimens of apparatus made by the students.

Education

During the morning, three short talks were given by Dr. Cecil L. Wilson, M.Sc., A.R.I.C., dealing with "Some Aspects of Microchemical Education." He pointed out that the teaching of microchemical methods to students had other beneficial results besides the mere imparting of information. Students so trained were more likely to be careful and to show initiative. The introduction of microchemical methods was, in addition, capable of giving rise to appreciable saving in several directions. Finally, in order to ensure the development of microchemistry to the fullest point in this country, some organised education was necessary, which might take the form of three types of courses, the nature of which Dr. Wilson outlined.

It is to be hoped that other parts of the country will follow the lead shown by South Yorkshire, both last year and this year, and make some effort to impart more widely to industrial and educational workers and organisers the many aspects of microchemistry.

"Master Key" Industries

Resolution Amended

IN the animated discussion which followed the principal speakers at the open meeting convened by the London section of the B.A.C. to discuss the post-war protection of British scientific industries (reported in our last week's issue), several amendments to the proposed resolution were dealt with, though only one was passed. Mr. W. C. Peck proposed that the whole of the resolution from the words "We submit" be omitted, on the ground that it was better to avoid controversial points at this stage, and to present to the Government a resolution in general terms with which practically the whole meeting was in agreement. Controversial points would, he thought be better presented in a considered report, and he suggested that the resolution should be altered to read as follows:

"This meeting desires to draw the attention of H.M. Government to the importance of giving immediate and special consideration to the maintenance and development in Great Britain of those industries formerly covered by the Safeguarding of Industries Act (Part I) and requests the British Association of Chemists to compile and publish a report dealing with the points raised."

After further discussion the resolution in its new form was put to the meeting and carried by a majority, and the meeting closed with a vote of thanks to Mr. Sheldon for the trouble he had taken in organising it.

Shell Oil Co., Inc., in co-operation with Shell Development Co. and Shell Chemical Division of Shell Union Oil Corp., is to establish an agricultural laboratory at Salida, Calif., at a cost of about $600,000. T. R. Hansberry, formerly associate professor at the New York State College of Agriculture is to head the staff.

Monsanto Chemical Co. has started commercial production of DDT at its John F. Queeny plant, St. Louis, Mo. Except for a small quantity devoted to scientific experiments the entire output is reserved for the military. Plant capacity is to be considerably expanded, in view of the peacetime possibilities of the product.

Metallurgical Section

Published the first Saturday in the month

Metallurgical Section

November 4, 1944

Hydrometallurgical Treatment of Cobalt Ores*

Conversion to Soluble Sulphates

by B. DU FOUR, A.R.S.M.

SOME ten years ago a rich cobalt mine was found in Queensland and extensively developed. The oxidised ores consisted mostly of erethrine or cobalt bloom, an arsenate of cobalt having the formula $Co_3As_2O_8.8H_2O$. The ore also carried about 0.15 per cent. nickel and, of course, some iron and silica. At a greater depth sulphides and arsenides took the place of erethrine, occurring as cobaltine (CoS_2 + CoAs.) Picked ore assayed from 18 per cent. to 24 per cent. cobalt and 0.15 per cent. nickel. Later, a concentration plant was erected, the concentrate carrying approximately about 22 per cent. cobalt and 40 per cent. arsenic.

Considerable quantities of high-grade arsenical cobalt ores, low in nickel, could be made available in Australia, and there also exist copper ores rich in cobalt and free from arsenic and nickel.

Considerable laboratory experimental work was carried out upon Australian copper-cobalt ore which assayed 23.75 per cent. cobalt, 25 per cent. copper, 3 per cent. silica with the balance iron pyrites. Some 10 tons were treated, the products being cobalt carbonate and basic sulphate of copper. As the mine was in a very undeveloped state the treatment of this ore was simply a demonstration of the feasibility of treating such ores by hydrometallurgical methods.

Sulphating Operation

The general scheme of treatment was to convert the total metal content of the ore to water-soluble sulphates, which meant that the initial dissolving solutions would carry cobalt-copper sulphate, a plum-coloured double sulphate, sulphate of iron and some alumina. The digester, or sulphating unit, consisted of a ship's wrought iron tank, 4 ft. by 4 ft. by 4 ft., cut in halves. One-half was mounted in brickwork with a fire grate underneath.

Five cwt. of roasted ore were placed in this tank and to it was added sufficient 70 per cent. sulphuric acid to convert all metals present to sulphate. An excess of 5 per cent. sulphuric acid was added as a precautionary measure. The ore and acid were mixed to the consistency of thick porridge. A small fire was lighted on the grate and a loose cover placed over the tank in order to ensure that it was continuously full of sulphuric acid fumes. This sulphating operation was started at 5 p.m., and once the fire had been lighted and primed with coke, the operation continued without attention until the following morning. By that time the contents of the tank had been converted to a solid, dry, vivid pink, crystalline mass of cobalt sulphate together with impurities. This material was broken up by means of a bar and shovelled into the dissolver.

The dissolvers, two in number, were round wooden tanks 4 ft. dia., by 6 ft. high, each with a 60 deg. cone of brick in the bottom. Compressed air used for agitation purposes was delivered by means of a hose hanging vertically from an air main above them. Each dissolver had its own air main coming direct from a compressed air reservoir so that there was no chance of one dissolver robbing another of its air, and they each consumed about 5 cu. ft. of air per minute at a pressure not exceeding 3 lb. per sq. in. The column of liquid thrown up by the centre pipe of each dissolver mounted to a height of about 9 in. above the level of the solution in the tank. This was made use of to aid in dissolving the sulphated mass.

As a protection against splashes and boils over, each dissolver stood on a lead tray which in turn drained to a vacuum filter vat. The iron binding rods which held the staves of the tank together were wrapped in thin sheet lead as a protection against the corrosive action of the strongly acid copper sulphate solution.

Silica and Iron Precipitation

After the sulphates had been dissolved in water there was practically no residue.

* From an article in *Chemical Engineering and Mining Review*, October 10, 1942.

Powdered limestone was added until the solution became neutral. At this point silica was precipitated and considerable iron thrown down as ferric hydrate: all the iron was not precipitated, owing apparently to the high density of the solution and the very heavy precipitation of calcium sulphate. The dissolver was allowed to stand for several hours, when the comparatively clear plum-coloured solution (a double sulphate of copper and cobalt) was siphoned off to a stock tank and the remaining thick residue, consisting of precipitated calcium sulphate and ferric hydrate, was drained away from the bottom to a vacuum filter.

This residue was difficult to filter, and in fact, without the presence of considerable calcium sulphate to act as a spreader for the silica, it would have been quite unfilterable. The next step was the precipitation of the remainder of the iron by means of powdered limestone in a much diluted solution. This was carried out in a wooden Pachuca tank 8 ft. dia. by 12 ft. deep. The iron was practically all in the ferric state which is, of course, necessary for precipitation, as shown by the following chemical equation:

$$2FeSO_4 + 3H_2SO_4 + Co_2O_3 = Fe_2(SO_4)_3 + 2CoSO_4 + 3H_2O.$$

Any trace of ferrous iron was converted to the ferric state by means of the air of the central air lift, and then precipitated. Thus all iron was eliminated from solution, leaving only sulphates of copper and cobalt plus a little calcium sulphate. The finished solution was chemically tested for iron until there was no reaction.

Vacuum Filtration

The contents of the Pachuca were run from the bottom to a storage vat, and through a vacuum filter leaf the clear solution was drawn away and delivered to a second Pachuca tank, where it was treated cold for the elimination of its copper content.

The pipe framework of the vacuum filter leaves was constructed of copper, and other portions of the vacuum filter plant, such as the vacuum cylinder and spray trap, were of mild steel plate lined with sheet lead. The vacuum pump was of a dry rotary type and the filter leaves were placed below the vacuum cylinder.

The copper-cobalt solution was agitated in a wooden Pachuca tank by means of compressed air with the addition of powdered soda carbonate. The copper was precipitated as a light buff blue-green basic sulphate carrying 50 per cent. copper. On the complete precipitation of the copper the content of the Pachuca was run down into a wooden storage tank, and from there the clear, pure cobalt sulphate solution was pumped to a cobalt sulphate storage tank made of galvanised iron. A vacuum filter leaf was attached to the suction side of the pump. The copper precipitate was pumped through a four-vat counter-current decantation plant in order to wash out the cobalt sulphate solution and was then finally dewatered by means of a vacuum filter leaf, and stored in a bitumen-lined galvanised iron tank with a removable lid.

The pure cobalt sulphate solution was boiled in a corrugated galvanised iron tank, 8 ft. dia. by 6 ft. high, set in brickwork over a double fire grate. Soda carbonate was added in small quantities by hand until only a trace of cobalt was left in solution. The cobalt carbonate precipitate was allowed to settle overnight and the supernatant solution of magnesium sulphate was then siphoned to waste through a filter leaf. The wet precipitate was pumped by means of a hand diaphragm pump to a storage tank, and then drawn by the first series of hard lead diaphragm pumps to the counter-current washing plant. Finally, it was dewatered by means of a vacuum filter leaf and stored in a covered galvanised iron tank before going to the dryer house.

Drying Cobalt Precipitate

The dryer consisted of a long box-like structure made of Sisalcraft insulating board, divided into shelves on which were placed galvanised iron trays to hold the wet cobalt precipitate. The moist precipitate and hot air travelled counter current. The precipitate shrank considerably on drying and its surface was covered with a skin of black cobalt oxide, about 1/1000 in. thick. The dry lumps were first crushed and then filled into jute bags, lined with pillow slips.

The overall recovery of the cobalt content of the ore, represented by actual sales, was 65 per cent. The ore was not resampled and assayed when it eventually reached the hydrometallurgical plant.

It is significant that the recovery from the treatment of 11 tons of oxidised arsenical ores, carrying only about 10 per cent. cobalt, treated entirely at the hydrometallurgical plant except for its initial crushing, should have been so very much higher, about 90 per cent.

The War Production Board, Washington, has listed thirteen materials that will remain scarce for long after the end of the war in Europe. They embrace tin and plantation rubber. Copper controls will end as soon as Germany is defeated.

A protocol has been concluded after discussions between the British and Canadian Governments and the Soviet Government, according to which the latter is to pay the Canadian Government, over a period of six years, twenty million U.S. dollars (£5,000,000) as compensation for taking over the nickel mines at Petsamo, Finland.

Improved Bronzes

From Scrap or Commercial Metal

BRONZE with greatly increased strength and toughness can be made from common grades of tin and copper without the purchase of new or special equipment. The process is the result of several years of research and is now disclosed in the two latest publications of the Tin Research Institute, Nos. 120 and 121 (*J. Inst. Metals*, 1944, *70*, 127 and 275). In the former, Dr. W. T. Pell-Walpole describes the development of a flux de-gassing process which enables tin bronzes and phosphor bronze to be produced successfully from ordinary commercial grades of metal, or from scrap. This is achieved by using a simple flux containing borax, sand, and copper oxide. Bronzes containing 10 per cent. tin, suitably cast, can be extruded and subsequently cold-rolled and cold-drawn. A 10 per cent. tin phosphor bronze gave 24 to 28 tons/sq. in. tensile and 10 to 20 per cent. elongation on 2 in.

The method of casting giving the maximum tensile and rolling properties is described in Publication No. 121, by Dr. Pell-Walpole and Dr. V. Kondic. Variation in casting procedure has a considerable effect on the quality of de-gassed chill-cast 10 per cent. bronze. By adopting the procedure recommended, a bronze which can be extruded, hot-rolled, forged, or hot-stamped is readily obtained. Bronze bars or strip which can be worked up to 75 tons tensile and yet retain their toughness provide what is virtually a new product with a wide potential field of usefulness.

Gravity Die Casting

Treatment of Non-Ferrous Alloys

PHOSPHOR bronze, manganese bronze, and gunmetal are not generally suitable for die casting, as they lack fluidity; but gunmetal can sometimes be used. Naval brass and aluminium bronze are both excellent in their own sphere, but the wear on the dies is greater with the latter. A graphite dressing for the dies not only protects them out also increases the fluidity.

As a general rule, the weight of the runner plus any risers is one and a half times to twice that of the metal in the casting, according to the type of casting and where it can be fed, but castings weighing, say, 3 or 4 gm., may require as much as eight times their own weight to bring corners or edges up sharply. Plates are inserted in the die, or vent plugs or fine lines cut to allow the air to escape so that the metal may entirely fill the die. The heavy feed assists in the weight behind the casting, and the runner is finally cut off and returned for remelting. The designer can usually foresee where contraction will occur and place a riser there so that the metal can feed back.

The maximum weight for die castings is generally between 20 and 30 lb., but the greater difficulty of working the larger dies must be borne in mind as well as temperature control. Another factor to be considered is whether the number of castings justifies the cost of the big die. The risk of rejects in the larger castings is relatively a more serious matter, while the larger dies require special arrangements for heating and hydraulic gear for their operation, so that the production cost is higher *pro rata*.

The die is preheated before casting, and dipping in the dressing solution before each cast reduces its temperature to the working condition. As a result, the surface of the die shows a number of cracks in course of time, and the die eventually fails by cracking and recomposition of the surface. If allowed to continue in use, the die might get to the stage where an undercut was created by metal flowing into the cracks, and difficulty might be experienced in releasing the casting from the die. The core pieces have to be replaced more often, as they are usually of small dimensions, and consequently burn and crack more easily. (*Machinery*, *64*, 1646).

NEW COPPER-PLATING PROCESS

An improved high-speed copper-plating process which reduces operating costs and speeds up production is announced by Du Pont de Nemours & Co. It is a development of the copper-plating process introduced by the company in 1938. The original method plated heavier deposits of copper in a shorter time than had been possible before, utilising a carefully compounded and controlled sodium copper cyanide bath operating at 100 per cent current efficiency and at increased current densities. The new gains were achieved by working out a method of substituting potassium cyanide and other potassium salts for the sodium salts formely used, with still further increases in current densities.

CHROME ORE ANALYSIS

The following statement on Chrome Ore Analysis has been issued by the Government Chemist:—In the table of International Atomic Weights 1941 (O=16) the atomic weight of iron is 55.85 and that of chromium is 52.01. Using these atomic weights the factor for converting a known weight of ferrous iron to its equivalent weight of Cr_2O_3, according to the relationship $6Fe \equiv Cr_2O_3$, is 0.4537; and this is the correct factor to use for this calculation.

Bolivian Tin

Post-War Prospects

THE Mining Bank of Bolivia recently issued a report dealing with the prospects of Bolivian tin in the post-war period. The Bank states that the position of this principal Bolivian export is firm at present and appears likely to continue so.

It is expected that, following the cessation of the war, some time will have to elapse before the smelters in the Far East can be put into full production, that such production during the first years will be insignificant, and that as a consequence, only a fraction of what was produced before the war will be available, in the period following the end of the war. It is believed that the United States will continue to require considerable quantities of concentrates, but the outstanding question is that of the availability of smelters.

Havoc in the Far East

During the ten years prior to the outbreak of hostilities in the East Indies, the greater part of the concentrates from the Indies were smelted in the Netherlands, and it does not appear probable to the Mining Bank that the smelters have escaped or will escape destruction. All tin produced in Malay, Thailand and Indo-China was smelted at Singapore and Penang, but the smelters in those countries will possibly also be demolished.

The report also mentions that the *American Metal Market*, when commenting on certain declarations made by the Vice-President of the War Production Board for International Supply, stated that the tin situation following the present war would be the reverse of that of the 1914-1918 situation, when the embargo on stocks continued into 1919, permitting the liquidation of accumulated stocks by the countries at war. In the present situation the various countries will be faced with the task of restoring the mines in the Far East and procuring rapid transport of concentrates to the smelters. As a consequence, it is felt that considerable time will elapse before the tin industry is absolutely free and both smelters and consumers of this metal will have to take this fact into account.

Another authoritative source, the *Inter-American Review*, admits that, as a result of the destruction of the equipment in the Far East, Bolivia will have a market for its maximum production for a period of at least five years after the restoration of peace. However, it adds that the Bolivian situation in the world tin industry will depend upon its capacity to reduce its costs of production, for it cannot be thought that it will continue to receive 60 cents per lb. when supplies from the Far East are renewed. During the six years between 1934 and 1939, a period during which the international tin control operated, the average quotation in New York was 50 cents per lb. and that in London £220 per ton. From this it infers that possibly Bolivian producers will take these figures into account in their post-war calculations.

Empire Copper Conference

Cartel Revival Possible

AT a conference held in Montreal, representatives from Canada, N. Rhodesia and South Africa discussed the position of the copper market after the end of the war in Europe. They also considered whether Empire interests could be dealt with as a single entity, both from the producer's and the consumer's point of view.

Decisions regarding the British market dealt with tonnage and prices, the disposal of surplus refined stocks and with scrap supplies. It is not unlikely that, as a result of these discussions, the pre-war copper cartel might be revived.

Canadian copper producers' contracts with the Ministry of Supply end on January 31, subject to three months' notice. While a renewal is under discussion, a reduction in quantities required is likely. Two large British Columbia concerns ship copper concentrates to the U.S. and are, therefore, in a different position.

Stock of newly-mined metal, owned by the Allies, will, according to estimates, aggregate some 2,500,000 tons at the end of the war. In addition, there is copper to be reclaimed from military equipment and the usual industrial scrap.

Revival of restrictive agreements for copper is hardly the way towards achieving an expanding world economy and, as far as Britain is concerned, the maintenance of the price at 10.02 cents per lb. will hardly provide industry with ample and cheap supplies, nor will it assist our export trade. The conference delegates would, therefore, be well advised to consider whether their interests would, in the long run, not be better served by an increasing use of the metal.

Cooling-Water Temperature Control

Automatic Regulator for Condensers

THE use of automatic temperature regulators of various types is a regular practice in heating applications where the flow of heating medium to equipment is controlled by increasing or reducing the flow in accordance to the demand. It is, however, seldom realised that the installation of so-called reverse-acting regulating valves in cooling-water supplies provides the best means of reducing the amount of cooling water to be used in the process. The following notes describe an interesting installation on a refining plant, using acetone as solvent. The simple, self-acting Temperature Regulator, made by Sarco Thermostats, Ltd., of Cheltenham, is shown in Figs. 1 and 2, marked with white arrows.

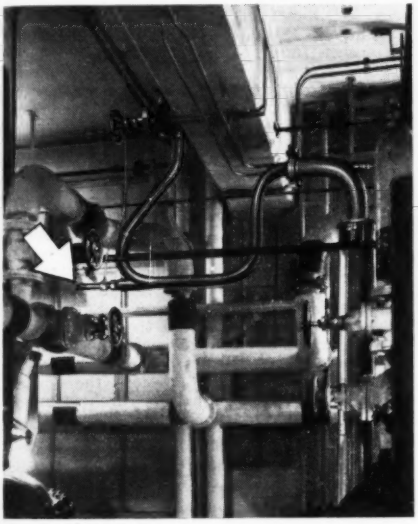

Fig. 1. Sarco thermostat bulb inserted in outflow pipeline from condenser.

Included in this refining plant is an acetone condenser and, for various reasons, it is most essential that the temperature inside the condenser should not be allowed to rise above a certain fixed level. The device to be used for controlling the flow of cooling water must be absolutely flame-proof, a condition that eliminates all electrically operated types of controls. The Sarco Temperature Regulator has been chosen because it is self-operating and requires no outside source of power for its operation.

The thermostat bulb, which is inserted in the pipeline carrying the condensed acetone liquid from the condenser, can be seen in Fig. 1. The pipeline is bent to form a swan-neck in order to keep the bulb flooded and in contact with the acetone liquid at all times. The regulating valve, fitted in the cooling-water inlet to the vacuum condenser, can be seen in Fig. 2; it is connected to the thermostat bulb by means of a flexible tubing. The setting of the ther-

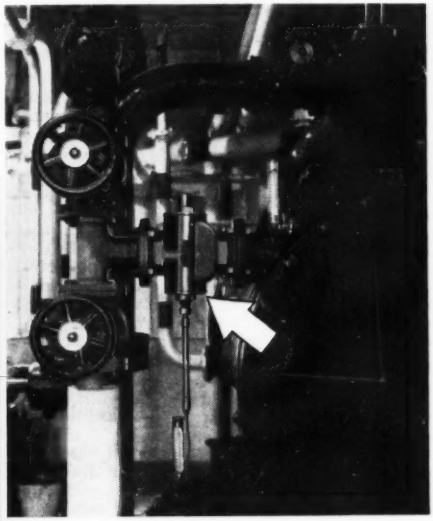

Fig. 2. Sarco regulating valve fitted in cooling-water pipe to condenser.

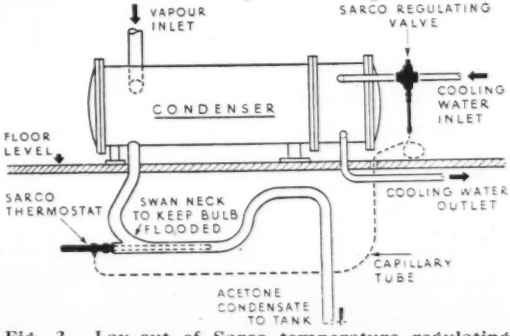

Fig. 3. Lay-out of Sarco temperature regulating system in an acetone condenser.

mostab bulb ensures that a correct temperature within the vacuum condenser can be achieved with the minimum consumption of cooling water. The system is shown diagrammatically in Fig. 3.

Fig. 4. Sarco temperature regulator; thermostat bulb suitable for immersion in liquids.

Fig. 4 illustrates the Sarco Temperature Regulator (Type TR-21) for immersion in liquids, as used for the above installation. The double-seated, fully pressure-balanced valve is reverse acting, *i.e.*, it opens with rise of acetone liquid temperature, which corresponds with the condenser temperature itself. Rising temperature thus admits more cooling water and *vice versa*, always in the right proportion to the demand. The working principle of this type of regulator is briefly as follows: The whole regulator system is filled with a temperature-sensitive mineral oil and, if the temperature surrounding the thermostat bulb rises, expansion of the oil within the bulb is hydraulically transmitted *via* the flexible tubing to the valve-acting element fitted to the regulating valve.

It should be noted that water consumption has been considerably cut down, compared with ordinary system of using a hand controlled valve in the cooling line; while the steadiness of condenser temperature improves the output and makes the whole process more uniform. Sarco Temperature Regulators are used for control of all kinds of condensers, stills, process vessels, etc. They can be applied also to the control of heat exchangers or unit coolers, wherever a constant temperature has to be maintained by varying the amount of flow of cooling or heating media in process work.

Parliamentary Topics

Release and Training of Scientists

IN the House of Commons last week, Mr. Edmund Harvey asked the Minister of Labour, whether, in view of the importance of setting in motion, at the earliest possible date, schemes of industrial research and development, involving large numbers of scientists, plans had been made for the earliest possible release of such persons from war service and for the training of younger men to supplement them.

Mr. E. Bevin said that applications for the release from the Forces of trained scientists could be made under the Governments plans for the re-allocation of man-power after the defeat of Germany, which contain provision for the early release of a strictly limited number of specialists. He was in touch with the President of the Board of Trade about the re-allocation, within industry, of scientists at present engaged upon war work. The conditions on which students may be permitted, after the cessation of hostilities with Germany, to begin or continue their scientific training are under consideration.

Scientific Posts

In a written reply to a question by Sir E. Graham-Little, the Chancellor of the Exchequer stated that the highest scientific posts in the Civil Service carry a salary, from April 1, 1944, of £2000. These posts are: Director of Scientific Research, Admiralty; Director-General of Scientific Research and Development, Ministry of Supply; Director of Scientific Research, Ministry of Aircraft Production; Director of Royal Aircraft Establishment, Vice-Controller of Communications Equipment, Chief Scientific Adviser, Ministry of Works.

Broadcasts on Science

Sir E. Graham-Little asked the Minister of Information about the B.B.C.'s arrangement of broadcasts relating to science; what was the Corporation's scientific advisory committee and, if such a committee was not in existence, whether he would recommend its appointment.

Mr. Bracken said that the B.B.C. had no scientific advisory committee. Its present practice was to get advice on scientific subjects from the Royal Society, the British Association, the Medical Research Council, and other authoritative sources.

Light Metals for Housing

Mr. Astor asked the Parliamentary Secretary to the Ministry of Works whether he had had consultation with the light metal industry as regards the contribution that it would make to the solution of the housing situation.

Mr. Hicks stated in a written reply that there had been consultation between his Ministry and the Ministry of Aircraft Production and with the Light Metal Industry on the possibilities of using light alloys for house construction. It was too early to make a statement on the subject, but a prototype had been ordered, from which it was hoped to form a judgement of the possibilities.

Scientific equipment imported by Canada in the first six months of 1944 was valued at $4,361,000, according to official statistics. During the last half of 1943, imports were valued at $5,349,000.

Personal Notes

MR. D. MAELOR HUGHES, who has been general manager of British Benzol and Coal Distillation, Ltd., since its inception, has been appointed a director of the company.

PROFESSOR SIR WILLIAM WRIGHT SMITH, King's Botanist in Scotland, has been elected president of the Royal Society of Edinburgh, in succession to PROFESSOR E. T. WHITTAKER, F.R.S., who has held office for five years.

MR T. C. MOOREHEAD, joint managing director of United Glass Bottle Manufacturers, Ltd., is retiring at the end of this year. MR. H. J. JUDD, joint managing director, becomes managing director on January 1 next.

The Widnes Independent Labour Party have announced their intention of running MR. BOB EDWARDS, of Chorley, secretary of the Lancashire Division Council of the Chemical Workers' Union, as their parliamentary candidate at the next election.

MR G. L. BAILEY, M.Sc., formerly of the Research Department, Royal Arsenal, Woolwich, succeeded Dr. Harold Moore on October 31 as director of the British Non-Ferrous Metals Research Association, with which, before the war, he had served as development officer.

PROFESSOR I. M. HEILBRON, D.S.O., Ph.D., F.R.I.C., is a member of the new research committee appointed by the Colonial Secretary to consider methods of combating human and animal trypanosomiasis, under the chairmanship of Mr. G. H. Creasy.

MR. E. HARRISON, coke-oven manager at the Cleveland Works of Dorman, Long & Co., Ltd., Middlesbrough, was formally installed as president of the Coke-Oven Managers' Association at their annual luncheon at the Waldorf, London, W.C., on Thursday last week. MR. W. N. WARWICK was elected vice-president.

MR. F. S. MITMAN, who recently joined the board of the Brush Electrical Engineering Co., Ltd., is a specialist in light alloys. After some years' association with the light alloy industry, he was in 1939 appointed Director of Light Alloys and Magnesium (Sheet and Strip) Control in the Ministry of Aircraft Production. In 1941-42 he was Adviser on Light Metals Fabrication in the same department.

The Victoria Cross has been awarded, posthumously, to CAPTAIN MICHAEL ALLMAND, Indian Armoured Corps. (attd. 6th Gurkha Rifles) for superb gallantry, outstanding leadership, and protracted heroism in the Burma campaign. Captain Allmand was a son of Professor A. J. Allmand, M.C., D.Sc., F.R.S., F.R.I.C., Assistant Principal of King's College and Daniell Professor of Chemistry in the University of London.

DR. A. H. MIDDLETON, who recently received the honorary degree of D.C.L. in the University of Durham, has been further honoured by the Coke-Oven Managers' Association, with the presentation of an illuminated address and two Sheffield plate salvers. It was Dr. Middleton, it will be remembered, who, in the early 1920's, introduced from America the technique of making silica bricks. He has been three times president of the Coke-Oven Managers' Association.

Obituary

In our last issue, owing to a printer's error, the date of the death of MR. GORDON ROBBINS was given as October 10. The date should have been October 18.

MAJOR WILLIAM KEITH MACLACHLAN, D.S.O., who died at Killearn, Stirlingshire, on October 25, was director and secretary of the United Turkey Red Co., Ltd.

MR. W. D. GRAHAM MENZIES, who died at Blairgowrie, Perthshire, on October 24, aged 86, was a former chairman of the Distillers' Company, Ltd.

DR. HENRY J. S. SAND, D.Sc., Ph.D., F.R.I.C., who died at Nottingham on October 18, aged 69, was, until his retirement in 1938, head of the Department of Inorganic and Physical Chemistry at the Sir John Cass Technical Institute, London, E.C. A native of Dundee, he was educated at the High School there, and at the Universities of Dresden, Zurich, London (University College), and Birmingham. From 1901 to 1914 (when he went to the Cass Institute) he was lecturer and demonstrator at University College, Nottingham. His Fellowship of the Royal Institute of Chemistry dated from 1920. He had given special attention to electrochemistry and electrochemical analysis, and contributed numerous papers on those subjects.

DR. THOMAS SWINDEN, D.Met., F.R.Ae.S., M.I.A.E., vice-president of the Iron and Steel Institute, and a former director of research of the United Steel Companies, died at Sheffield on October 27, aged 58. Educated at Sheffield, Stockholm, and Upsala Universities, he became chief chemist and metallurgist, and later works director, to Samuel Fox & Co., Ltd. He was awarded the Carnegie Gold Medal in 1914 for research on tungsten and molybdenum steel, and in 1941 received the Bessemer Gold Medal "in recognition of the value of his original investigations into the metallurgy of steel, and of his eminent services to the organisation and direction of research in the steel industry." After Dr. Hatfield's death he was appointed chairman of the Joint Research Committee of the Iron and Steel Institute.

General News

From Week to Week

The head office of the British Coal Utilisation Research Association is, from November 1, situated at 13 Grosvenor Gardens, S.W.1. The telephone number is VICtoria 1534.

An account of the Struy lead mines, Inverness-shire, and of wulfenite, harmotome, and the other minerals which occur there was given in a paper read by Sir Arthur Russell before the Mineralogical Society.

Sir Malcolm Robertson, M.P., chairman of the British Council, and Lady Robertson held a reception on Thursday last week at the Dorchester, London, W.1, in honour of the Indian scientists now visiting this country as the guests of H.M. Government.

Oxford University has gratefully accepted I.C.I.'s offer of £7200 a year for seven years for the purpose of founding research fellowship in chemistry and physics, and has established an electing committee to carry out the objects of the gift.

The self-heating soup can used by British and U.S. Forces was developed as a result of co-operation between I.C.I. and H. J. Heinz, Ltd., it is announced. The cartridge device for heating the cans was invented early in the war at I.C.I.'s Ardeer Works, in Ayrshire.

The British Standards Institution has issued a comprehensive new Glossary of Terms used in the Gas Industry (B.S. 1179—1944; price 3s. 6d.), undertaken, at the request of The Institution of Gas Engineers, by a committee fully representative of the industry.

As many as 102 hydro-electric schemes are to be promoted after the war in the Highlands and Western Islands of Scotland, according to a statement made at a public meeting at Pitlochry, Perthshire, last week, by Mr. Neil Beaton, a member of the North of Scotland Hydro-Electric Board. The number of persons to be employed on construction, if these schemes go through, will eventually be between 10,000 and 12,000.

The British Colour Council has just issued its spring and summer ranges, introducing brighter colours and suggesting something of the range and scope of dyestuffs still available for export and civilian use. Dyers who remember the faded greys and drabs of 1918 will appreciate the chief factor which has contributed to the satisfactory position—the great development of Britain's dyestuff industry in recent years.

The institution of a Vans Dunlop Scholarship in technical chemistry has been approved by the Edinburgh University Court, on the recommendation of the Senatus.

A paper on "Effects of Pollution on Deposits in the Mersey Estuary" was read by Dr. A. B. Southgate at a meeting of the three chartered bodies at Bristol, while Mr. C. L. Haddon lectured on "Gypsum Plaster Products" to the Manchester section and the Road and Building Materials Group of the Society of Chemical Industry.

As a result of the use of cobalt in steel hardening, Scottish farmers are complaining of a shortage of cobalt for the treatment of ewes before tupping, with consequences detrimental to the season's crop of lambs. At a conference last week an assurance was given by Mr. W. S. Ferguson, of Bricknell, that he would approach I.C.I. on the matter to obtain a sufficient release of cobalt for the farmers.

The Guild of Graduates of Birmingham University is investigating the possible demand for lecture courses at university level in Electrodeposition and Allied Subjects. Further information will be obtainable from the Hon. Sec. of the Midlands Centre, Electrodepositors' Technical Society (Capt. H. J. Bache), at the James Watt Memorial Institute, Great Charles Street, Birmingham

Steps to curtail the activities of the I.G., in order to prevent a repetition of the experience of the last five years, were demanded by Mr. James Ewing, of the Bradford Dyers' Association, Ltd., at last week's meeting of the West Riding section of the Society of Dyers and Colourists, held at Bradford. Germany must be deprived, he said, of those industries which formed the breeding ground for armaments, and one of the main industries coming within that category was that of chemicals and dyestuffs.

Local press reports give some details of the "million-pound factory" for producing penicillin which is in course of erection on Merseyside. Alderman A. E. Shennan, chairman of the Finance and General Purposes Committee of the Liverpool Corporation, stated that the job was expected to be complete by the end of this year, and the factory in production early in 1945. The buildings of the factory will occupy twelve acres and will employ a large number of workers.

The revised edition of the *Handbook of the Chemical Engineering Group*, S.C.I., already under consideration before the outbreak of war, has now made its appearance. A re-statement of the objects of the Group, and alterations to Rules 4, 6, 7, and 21 have been included, and the graph of membership (an extremely healthy one) and the list of officers have been brought up to date. The original form of the booklet, however, has been retained as far as possible, because of the historical and sentimental value that it has for many members of the Group.

Foreign News

The city of Bombay has 26 chemical plants, the most important of which are engaged in manufacturing pharmaceuticals. These factories employ 938 workmen.

A sample of cinchona bark from Uganda is stated to have had a quinine content of 15.7 per cent., which is believed to constitute a record analysis.

The Stauffer Chemical Co. has acquired 28 acres in Virginia as a site for the erection of a bisulphide plant at a cost of $500,000, to be completed in about six months.

Mr. Harold Ickes, U.S. petroleum administrator, stated recently that 65 refineries are now producing 100-octane petrol, as against 23 at the beginning of the war.

Canadian oil companies are intensively engaged on prospecting work. Increased drilling is to take place in the Taber area of Southern Alberta, which is considered as promising.

In El Salvador a technical committee, consisting of five physicians, has been appointed to control the distribution of penicillin, the sale of which, without a licence, is prohibited.

The United States has investments amounting to approximately $35,000,000 in natural rubber properties in the Far East, as compared with $700,000,000 spent in establishing production of synthetic rubber.

Up to December 31, 1943, the Canadian pipeline and refinery project had cost $104,756,468, and a further expenditure of $29,184,720 is expected before completion, according to the Truman Committee.

In Uruguay, the shortage of arsenic has been relieved by shipments from an undisclosed South American source. Sulphate of ammonia for sugar refining and mercury products are, however, reported in short supply, states *Foreign Commerce Weekly*.

A plant to produce arsenite of copper has been established in Peru by the National Antimalarial Service. It will have an output sufficient to meet needs. The product is expected to replace imported paris green in the manufacture of insecticides.

A new company, partly Government-owned, has been formed in Argentina to produce synthetic rubber. The concern is called "Atanor: Compañia Nacional para la Industria Química Sociedad Anónima Mixta" and has a capital of 12 million pesos.

The coal-tar distillation industry in Canada in 1943, the Dominion Bureau of Statistics reports, had an output valued at $6,540,285 compared with $6,805,791 in 1942, a decrease of 3.9 per cent. Materials used for manufacturing cost $4,059,598, including 40,307,935 gallons of crude tar valued at $3,177,014.

Spain's output of iron ore for the first quarter of the current year amounted, according to the *Boletin Minero Industrial*, to 412,792 tons as compared with 387,891 tons in the same period of 1938. Steel production, for the first five months, rose from 275,815 to 288,776 tons.

Henry J. Kaiser—well-known for his novel ship-building methods—has made an agreement with the Standard Gypsum Co. to expand plants and the market for gypsum products after the war. A new corporation, Standard Gypsum Co., of Delaware, is to be formed.

Four large companies established in Spain for the production of nitrogenous fertilisers will soon reach their estimated output of 51,250 tons of pure nitrogen annually, according to a statement of the Spanish Minister of Industry and Commerce. These concerns have a capital of 445,000,000 pesetas.

New industries started in Kenya by the East African Industrial Management Board during the first six months of this year produced 390 tons of caustic soda solution, 195 tons of whitewash, 169 tons of calcium carbonate, 40 tons of sodium arsenite and the equivalent of 71,860 gallons of pyrethrum spray.

Statens Skogindustrier A/B has built a vinegar plant in connection with its wood distillation works at Pitea, Sweden. It will produce both chemically pure and technically pure acetic acids from the waste liquors of the distillation plant. Facilities also have been provided for converting the acetic acid into acetone and solvents for the lacquer and varnish industries. The new plant has an estimated capacity of 1000 metric tons of acetic acid annually.

The industrial progress made by Canada during the war is discussed in a pamphlet entitled "Will There be Post-War Jobs?" by Mr. Leonard Marsh, a prominent Canadian economist, who revealed that in 1939 industries in Canada employing more than 15 employees provided work for 600,000. In 1943, this number had doubled. The chemical industry rose by 340 per cent. and iron and steel by 273 per cent. In a period of four years Canadian manufacturing industry developed as much as in 25 normal years.

Duro-Chrome of Chicago, Inc., is a new division of the Vacuum Can Company, which will specialise in industrial chrome treatment of tools, dies, moulds, etc., under the registered trade-mark name of "Duro-Chrome."

The exportation of quinine salts from Colombia is now prohibited in order to conserve domestic supplies; producers and dealers are also required to declare their stocks.

The John Scott Medal has been awarded by the Philadelphia City Trusts to Sir Alexander Fleming for his work on penicillin. It was accepted, in Sir Alexander's absence, by Lord Halifax. The medal was established in Philadelphia in 1816 by John Scott, an Edinburgh chemist, who left a large trust fund in the hands of the City Trusts for the purpose of honouring men of science.

Kenya maintains its position as the most suitable country for growing pyrethrum. Kenya flowers contain 1.3 to 1.5 per cent. of the active principle, or about half as much again as the amount present in Japanese flowers. Work carried out at the Rothamsted Experimental Station was largely responsible for the establishment of this industry in East Africa.

The Y.P.F., the Argentine State Oilfields, report that output amounted to 2,632,901 cubic metres in 1943, an increase of 187,315 cu. m., or 7.7 per cent. Last year's output was 1,080,000 cu. m. higher than that of 1939. The import of equipment is still unsatisfactory. Argentina's imports of crude petroleum decreased from 2,145,000 cu. m. in 1939 to 485,000 cu. m. in 1943.

The extent of the development of Spain's chemical industry—referred to frequently in this column—is shown by the fact that the turnover (in million pesetas) of the Fabrica Española de Productos Químicos y Farmacéuticos increased from 0.5 in 1937 to 2.5 in 1938, 4.0 in 1939, 7.5 in 1941, and 11.0 in 1943. The company now produces a number of products formerly imported from abroad.

The discovery of a rubber-producing plant in British Columbia is now being investigated by the Canadian Department of Agriculture. Mr. N. Boldt, Vancouver, who discovered the plant in 1938, said that tests had resulted in the development of a potential annual yield of 600 lb. of rubber per acre, which is about double the average yield from standard rubber plantations.

Du Pont de Nemours' assistant chemical director, Dr. C. Coolidge, foresees a bright future for the company as "new projects and products will be launched when the war is over and there will be increased outlet for existing products." He described the research workers as "a new power in the world," and revealed that the United States industries have now about 70,000 of them in 3466 industrial laboratories.

Owing to the fact that the German-occupied part of Italy is cut off from salt supplies from oversea and from the southern part of the peninsula, the neo-fascist régime has permitted the production and sale of salt without licence. Furthermore, several new pans have been established on the Italian Riviera.

Forthcoming Events

The **Society of Chemical Industry** meets on **November 6,** at 2.30 p.m., at Burlington House, when Dr. A. Batley will read a paper on "Use of Sensitised Metal in Engineering Design."

The annual general meeting of the Leeds area section of the **Royal Institute of Chemistry** will take place on **November 6,** at 6.30 p.m. The president, Professor Alexander Findlay, will visit the section.

Mr. S. Baier and Mr. R. M. Angles will speak on "Electrodeposition of Tin-Copper Alloys, with special reference to Speculum" at the next Birmingham meeting of the **Electrodepositors' Technical Association** on **November 7** at 6 p.m., in the James Watt Memorial Institute, Great Charles Street.

The North-Western section of the **Institute of Fuel** meets at the Engineers' Club, Manchester, on **November 8,** at 2.30 p.m., when a Brains Trust on "The Efficient Utilisation of Industrial Waste and Town's Refuse" will occupy the attention of its members.

Professor I. M. Heilbron, D.S.O., D.Sc., F.R.S., will deliver a lecture on "Chemistry in Relation to National Prosperity," at a joint meeting of the **Chemical Society,** the **Manchester University Chemical Society** and the **Royal Institute of Chemistry,** to be held on **November 8,** at 5 p.m., in the Chemistry Lecture Theatre of the University, Manchester.

A joint meeting of the Food Group of the **Society of Chemical Industry** and the **Microbiological and Nutrition Panels** (with the annual general meeting of the Microbological Panel) will take place on **November 8,** at 2.30 p.m., at Burlington House. A paper by Dr. B. C. J. Knight on "Some Wider Aspects of Nutritional Studies with Micro-Organisms" will be read.

A lecture illustrated by lantern slides, on "Properties and Uses of Penicillin in Relation to Pharmacy," will be given by A. L. Bacharach, M.A., F.R.I.C., at the **Pharmaceutical Society of Great Britain,** 17 Bloomsbury Square, W.C.1, on **November 9,** at 7 p.m.

The first Lister Memorial Lecture will be given on **November 9,** at 5.30 p.m., in the Anatomy Lecture Theatre, Teviot Place, Edinburgh, when Sir Alexander Fleming, F.R.S., will speak on "Antiseptics" to the

Edinburgh section of the **Society of Chemical Industry.**

A joint meeting of the Sheffield section of the **Chemical Society** and the **University Chemical Society,** will be held on **November 10,** at 5.30 p.m., in the Chemistry Lecture Theatre of the University, when Prof. W. Wardlaw will lecture on "Co-ordination Compounds."

A meeting of the North of England branch of the **National Association of Colliery Managers** will be held in Newcastle-upon-Tyne, on **November 11,** at 2.30 p.m., when a paper will be read on "Fuel Economy," by Mr. J. B. M. Mason, Regional Fuel Engineer, Ministry of Fuel and Power (Northern "B" Region).

The South Wales section of the **Institute of Fuel** meets at the Royal Institution, Swansea, on **November 14,** at 6.30 p.m., to hear Dr. Davies read a paper on "The Underground Gasification of Coal."

A joint conference of the **Chemical Engineering Group,** the **Agriculture Group** (Society of Chemical Industry), and the **Institution of Chemical Engineers** on Grass Drying will be held at the Institution of Mechanical Engineers, Storey's Gate, S.W.1, on **November 14,** at 2 p.m. The following papers will be delivered: "Grass Drying—Chemical Aspects," by Dr. S. J. Watson; "Grass Drying—Engineering Aspects," by Mr. A. Goldberg and Mr. A. C. Bartelli; "Grass Drying—The Farmer's Viewpoint," by Mr. D. Fairclough.

The **Institute of Fuel** meets on **November 15,** at 2.30 p.m., at the Institution of Mechanical Engineers, Storey's Gate, S.W.1. Mr. B. F. Carthauser will deliver a paper on "The Development and Design of Shell Type Boilers."

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Bankruptcy Information

CHARLES L. MOORES & CO., 11 Bromsgrove Street, Birmingham, chemists. Public Examination, December 7, 2.30 p.m.., the Court House, Corporation Street, Birmingham, 4.

Company News

Cerebos, Ltd., pay an interim dividend of 10 per cent. on account of the year 1944.

Borax Consolidated, Limited, is paying, for the year ended September 30, an interim dividend of 3 per cent. on the preferred ordinary stock.

British Alkaloids, Ltd., declare, for the year ending March 31, 1945, unchanged interim dividends of 8 per cent. on the preference and of 12 per cent. on the ordinary shares.

Anglo-French Phosphate, Ltd., report a net profit, for the year to December 31 last, amounting to £6330 (£18,052). A dividend of 5 per cent. (7½ per cent.) has been declared. Carry forward £25,917 (£28,161).

Erinoid, Ltd., report a trading profit for the year ended July 31, of £86,640 (£121,334); taxation amounted to £61,546 (£95,306); net profit increased to £16,802 (£15,974). The ordinary dividend is again 10 per cent.

Chemical and Allied Stocks and Shares

STOCK markets have remained firm without improvement in the volume of business in most sections. Steady investment demand continued an upward trend in British Funds, War Loan, and Local Loans, while 2½ per cent. Consols showed further improvement and leading industrial shares again strengthened. Lever & Unilever were 45s. 7½d., Dunlop Rubber 48s. 9d., while Imperial Chemical, which still yield over 4 per cent., remained in better demand and further improved to 39s. 1½d. Turner & Newall were again higher, rising to 82s. 3d. on expectations that results for the year ended September 30 will create a good impression, although it is generally assumed the dividend will again be limited to 12½ per cent.; in 1938 it was 20 per cent., and the small current yield reflects expectations that after the war the dividend is likely to regain this level in due course.

Murex moved higher at 96s. 10½d. on the increased profits shown by the results. United Molasses kept firm at 38s. 3d. xd., while British Plaster Board strengthened to 39s. 3d., and the units of the Distillers Co. to 106s. 9d. Wall Paper Manufacturers deferred units have been firm at 44s. awaiting the full results and chairman's annual statement. Elsewhere, Associated Cement were firmer at 63s. 6d., and Tunnel Cement better at 50s. 7½d., while Babcock & Wilcox moved up to 51s. 9d. Ruston & Hornsby responded strongly, with a rise to 46s. xd., to favourable views of post-war prospects, and Firth Brown improved to 70s. 7½d. Pending the dividend statement, Tube Investments were little changed at 96s.; Stewarts & Lloyds kept steady at 55s. 3d., and Whitehead Iron rose to 82s. Allied Ironfounders showed steadiness at 51s. 6d., and Guest Keen firmed up to 37s. 4½d. awaiting the interim dividend.

Electrical equipments strengthened; English Electric to 52s., Associated Electrical to 53s., and General Electric to 93s. 9d. Firmness at 52s. 9d. was shown by Barry & Staines, with Nairn & Greenwich 73s. 9d., and Pinchin Johnson 39s. 6d. B. Laporte remained firm around 82s. De La Rue fur-

ther strengthened to 195s., with Erinoid steady at 11s. 3d., and British Industrial Plastics 2s. shares again 7s. 1½d. Textiles were stimulated by the Horrockses Crewdson dividend; Coats rose further to 51s. 6d., Fine Spinners to 25s., and Courtaulds to 55s. 6d. Metal Box shares remained steady at 90s. 7½d. Triplex Glass eased to 42s. 6d., the disposition being to await the full results and chairman's annual remarks. General Refractories, however, were better at 17s. 4½d. Gas Light & Coke ordinary remained around 23s.

Boots Drug were little changed at 56s., while Timothy Whites were better at 41s. and Sangers were 29s. Borax Consolidated deferred kept at 35s. 6d., British Match were 40s. 3d. xd. British Aluminium at 46s. 9d., and British Oxygen at 87s. 9d. also remained steady. Greeff-Chemicals 5s. ordinary were again 8s. xd., Monsanto Chemicals 5½ per cent. preference 23s., Burt Boulton 24s. 6d. xd., and British Drug Houses 28s. Fisons were 49s. Imperial Smelting at 14s. 4½d., and Amalgamated Metal 18s. 7½d. were little changed on balance. W. J. Bush remained held firmly, and moved up to 70s. British Glues 4s. ordinary kept firm at 8s. 6d. Awaiting the dividend statement, Lewis Berger were 103s. 6d. Avon Indian Rubber changed hands around 42s. Oil shares attracted more attention, "Shell" rising to 85s., Burmah Oil to 87s. 6d, and Anglo-Iranian to 118s 9d. Lobitos Oil improved to 53s. 6d on further consideration of the results and strong financial position, while Ultramar shares were active and rose strongly to £2s. 3d., but Trinidad Leaseholds eased to 92s. 6d. Royal Dutch further improved to 37s., aided by the Far Eastern war news.

British Chemical Prices

Market Reports

A STEADY trade in general chemicals is reported this week on the London market, and a fair weight of new business has been transacted, while contracts are being steadily drawn against by consumers. No price changes fall to be recorded and values generally remain on a firm basis. In the soda products section the position of caustic soda remains unchanged, both grades meeting with a steady inquiry. Supplies of bichromate of soda are quickly absorbed and buying interest in bicarbonate of soda and soda ash has been fairly substantial with quotations well held. Yellow prussiate of soda continues scarce, and chlorate of soda is being called for in greater quantities than are at present available. In the potash section acid phosphate of potash remains steady and British makers of permanganate are well booked and a fair volume of fresh inquiry is circulating. Yellow prussiate continues in short supply. In other directions white powdered arsenic, sulphur and calcium carbide are all very strong sections while good quantities of acetone and alum lump are being absorbed. Glycerine is a strong market with values firm. In the market for coal-tar products, pressure for contract deliveries is the chief feature and price conditions remains strong throughout.

MANCHESTER.—Chemical traders on the Manchester market during the past week have indicated a fairly steady demand against contracts for most descriptions, especially for the general run of soda compounds, as well as for the magnesia and ammonia products and for the acids, with a moderate amount of new business placed during the past week. Prices are well held throughout the range. In the tar products section the light materials are mostly in good request, especially toluol and benzol, with rather less pressure for the xylols. Creosote oil is in steady demand, with a fair business on home trade account being done in pitch. In the fertilisers seasonal activity is developing satisfactorily in most sections.

GLASGOW.—In the Scottish heavy chemical trade there is no actual change to report from last week. Home business remains very steady. Export inquiries, however, are rather restricted. Prices keep very firm.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

THE INSTITUTION OF CHEMICAL ENGINEERS EXAMINATIONS, 1945

APPLICATION forms (returnable 1st December, 1944) and particulars of the Associate-Membership Examination for 1945 may be obtained from the Hon. Registrar, Institution of Chemical Engineers, 56, Victoria Street, Westminster, London, S.W.1.

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None of the advertisements below relates to a woman between 18 and 41 unless such a woman (a) has living with her a child of hers under the age of 14, or (b) is registered under the Blind Persons Acts, or (c) has a Ministry of Labour permit to allow her to obtain employment by individual effort.

WANTED as junior partner and co-director first-class scientific and technological chemist for research laboratory (limited company), London. (Plastics, coal products, mineral oils). Nationality immaterial. Financial participation desirable but not conditional. Apply Box No. 2186, THE CHEMICAL AGE, 154 Fleet Street, London, E.C.4.

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FORMER Representative of Dutch Technical Trading Company with extensive branch office system in Dutch East Indies, seeks contact with British firms of repute desiring to prepare for post-war export. Write Box C.219 Willings, 362, Grays Inn Road, London. W.C.1.

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WANTED.—Supplies of Nitre Cake in ten-ton lots. Box No. 2126 THE CHEMICAL AGE, 154, Fleet Street, E.C.4.

WORKING NOTICE

THE Proprietors of the Patent Nos. 468450 for Improvements in or relating to rosin size, and 475259 for Improvements in or relating to resin size are desirous of entering into arrangements by way of licence and otherwise on reasonable terms for the purpose of exploiting the same and ensuring their full development and practical working in this country. All communications should be addressed in the first instance to Haseltine Lake and Co., 28, Southampton Buildings, Chancery Lane, London, W.C.2.

THE Patentees of British Patent No. 519,761 for "Method of making Alloys of Iron and Steel" are desirous of entering into arrangements for the granting of Licences to manufacture under this Patent. Enquiries should be addressed to F. J. Cleveland and Co., Chartered Patent Agents, 29, Southampton Buildings, London, W.C.2.

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